AMENDMENTS TO THE CLAIMS

Please amend the claims as follows:

1-2. (Canceled).

3. (Currently Amended) A demultiplexing method of receiving a multiplexed signal obtained by multiplexing a plurality of communication signals from a multiplexed signal transmitting section, demultiplexing the multiplexed signal into communication signals, and transmitting the demultiplexed communication signals to a communication signal receiving section, the method comprising:

adding, to each of the plurality of communication signals, an identification address preassigned to a predetermined signal identifying section through which a communication signal passes in a multiplexing system, including the multiplexed signal transmitting section and the communication signal receiving section, and outputting each of the communication signals;

extracting the identification address from each of the output signals;

demultiplexing the multiplexed signal for each of the communication signals on a basis of the extracted identification address; and

transferring, when the communication signals include a data packet, the data packet to a first interface block, and when the communication signals include a control packet, transferring the control packet to a Point-to-Point Protocol (PPP) processor,

wherein, when the communication signals are received through a second interface block and include a data packet, the data packet is transferred to the first interface block on a basis of an IP address of the communication signals, and the data packet is transmitted to a backbone network upon converting the packet into a packet over SDH/SONET (Synchronous Digital Hierarchy/Synchronous Optical Network) (POS) signal, and

wherein, when the communication signals in a multiplexed signal received from said demultiplexing apparatus through the second interface block include a control packet, the control packet is transferred to a PPP processor on a basis of an IP address of the control packet.

4. (Previously Presented) A method according to claim 3, wherein the communication signal includes a PPP packet created for each Internet subscriber apparatus, and the identification address includes an Medium Access Control (MAC) address.

5. (Currently Amended) A demultiplexing method of demultiplexing a multiplexed signal obtained by multiplexing a plurality of packets into packets, comprising:

extracting an IP address from each packet in a received multiplexed signal for each of the plurality of packets, the IP address being preassigned to a predetermined signal identifying section through which a communication signal passes;

demultiplexing the multiplexed signal into PPP packets on a basis of the extracted IP addresses; and

transferring, when the communication signals include a data packet, the data packet to a first interface block, and when the communication signals include a control packet, transferring the control packet to a PPP processor,

wherein, when the communication signals are received through a second interface block and include a data packet, the data packet is transferred to the first interface block on a basis of an IP address of the communication signals, and the data packet is transmitted to a backbone network upon converting the packet into a POS signal, and

wherein, when the communication signals in a multiplexed signal received from said demultiplexing apparatus through the second interface block include a control packet, the

control packet is transferred to a PPP processor on a basis of an IP address of the control packet.

6-7. (Canceled).

8. (Currently Amended) A demultiplexing apparatus which is connected to a multiplexed signal transmitting section through a multiplex communication path, demultiplexes a multiplexed signal received from the multiplex communication path, and transmits demultiplexed communication signals to a communication signal receiving section through communication paths for respective communication signals, the demultiplexing apparatus comprising:

address extracting means, connected to the multiplex communication path, for extracting an identification address, for each of the communication signals, which is added to each of the communication signals in the multiplexed signal received from the multiplex communication path and preassigned to a predetermined signal identifying section through which a communication signal passes in a demultiplexing section including said multiplexed signal transmitting section and said communication signal receiving section; and

demultiplexing means for demultiplexing the multiplexed signal into the respective communication signals on a basis of identification addresses of the respective communication signals which are extracted by said address extracting means,

wherein, when the communication signals in a multiplexed signal received from said demultiplexing apparatus through a second interface block include a data packet, the data packet is transferred to a first interface block on a basis of an IP address of the communication signals, and ~~transmitting~~ the data packet is transmitted to a backbone network upon converting the packet into a POS signal, and

wherein, when the communication signals in a multiplexed signal received from said demultiplexing apparatus through a second interface block include a control packet, the control packet is transferred to a PPP processor on a basis of an IP address of [[a]] the control packet.

9. (Previously Presented) An apparatus according to claim 8, wherein the communication signal includes a PPP packet created for each Internet subscriber apparatus, and the identification address includes an MAC address.

10. (Currently Amended) A demultiplexing apparatus which is connected to a multiplex communication path through which a multiplexed signal obtained by multiplexing packets addressed to subscriber apparatuses is transmitted, demultiplexes the multiplexed signal received from the multiplex communication path, and outputs each demultiplexed communication signal, comprising:

address extracting means, connected to the multiplex communication path, for extracting an IP address of each packet, the IP address being preassigned to a predetermined signal section of the multiplexed signal received from the multiplex communication path; and

demultiplexing means for demultiplexing the multiplexed signal into respective packets on a basis of the IP addresses of the respective packets extracted by said address extracting means,

wherein, when the communication signals in a multiplexed signal received from said demultiplexing apparatus through a second interface block include a data packet, the data packet is transferred to a first interface block on a basis of an IP address of the communication signals, and the data packet is transferred to a backbone network upon converting the packet into a POS signal, and

wherein, when the communication signals in a multiplexed signal received from said demultiplexing apparatus through a second interface block include a control packet, the control packet is transferred to a PPP processor on a basis of an IP address of [[a]] the control packet.

11. (Previously Presented) An access network system, comprising:

a plurality of subscriber apparatuses which transmit/receive one of a signal having an MAC address added to a packet and a signal having no MAC address added to a packet;

a subscriber multiplexing/demultiplexing apparatus which multiplexes packets in signals transmitted from said respective subscriber apparatuses on a basis of MAC addresses added to the packets or IP addresses of the packets, and demultiplexes an input multiplexed signal into packets on a basis of one of a MAC address added to each packet and an IP address of each packet; and

a protocol termination apparatus which includes a first interface block which interfaces with a backbone network, second and third interface blocks which interface a multiplexed signal with said subscriber multiplexing/demultiplexing apparatus, switching means, and PPP processing means,

wherein said protocol termination apparatus, when a packet in a multiplexed signal received from said subscriber multiplexing/demultiplexing apparatus through said second interface block includes a data packet, said protocol termination apparatus causes said switching means to switch to transfer the data packet to said first interface block on the basis of one of a MAC address added to the data packet and an IP address of the packet, and transmits the packet to a backbone network upon converting the packet into a POS signal by using said first interface block, and when a packet in a multiplexed signal received from said subscriber multiplexing/demultiplexing apparatus through said second interface block

includes a control packet, said protocol termination apparatus causes said switching means to switch to transfer the control packet to said PPP processing means on the basis of one of a MAC address added to the control packet and an IP address of the packet, and causes said PPP processing means to transmit the received control packet through said third interface block and perform PPP processing with said subscriber apparatus through said subscriber multiplexing/demultiplexing apparatus.

12. (Previously presented) A system according to claim 11, wherein the packet includes one of an Ethernet frame packet and an IEEE 802.3 frame packet, the data packet includes one of a PPP data packet in the Ethernet frame packet and a PPP data packet in the IEEE 802.3 frame, and the control packet includes one of a PPP control packet in the Ethernet packet and a PPP control packet in the IEEE 802.3 frame.

13. (Previously presented) A system according to claim 11, wherein the packet includes one of a PPP packet in an Ethernet frame packet and a PPP packet in an IEEE 802.3 frame packet, the data packet includes one of a PPP data packet in the Ethernet frame packet and a PPP data packet in the IEEE 802.3 frame, and the control packet includes one of a PPP control packet in the Ethernet packet and a PPP control packet in the IEEE 802.3 frame.

14. (Previously Presented) An access network system, comprising:

a plurality of subscriber apparatuses which transmit/receive one of a signal having an MAC address added to a packet and a signal having no MAC address added to a packet;

a subscriber multiplexing/demultiplexing apparatus which multiplexes packets in signals transmitted from said respective subscriber apparatuses on a basis of MAC addresses added to the packets or IP addresses of the packets so as to output a multiplexed

signal as a POS signal, and demultiplexes an input POS signal into packets on the basis of IP addresses of the packets;

an interface which is connected to said subscriber multiplexing/demultiplexing apparatus and transmits a POS signal; and

a protocol termination apparatus which includes a first interface block for interfacing with a backbone network, second and third interface blocks connected to said interface to interface a multiplexed signal with said subscriber multiplexing/demultiplexing apparatus, a switching means, and a PPP processing means,

wherein, when a packet in a multiplexed signal received from said subscriber multiplexing/demultiplexing apparatus through said second interface block includes a data packet, said protocol termination apparatus causes said switching means to switch so as to transfer the data packet to said first interface block on the basis of an IP address of the data packet, and transmits the packet to the backbone network upon converting the packet into a POS signal by using said first interface block, when a packet in a POS signal received from said subscriber multiplexing/demultiplexing apparatus through said second interface block includes a control packet, said protocol termination apparatus causes said-switching means to switch so as to transfer the control packet to said PPP processing means on the basis of an IP address of the control packet, and causes said PPP processing means to transmit the received control packet through said third interface block and perform first PPP processing as PPP processing between said subscriber apparatuses through said subscriber multiplexing/demultiplexing apparatus, and

said protocol termination apparatus transmits a control packet through said second interface block to perform second PPP processing as PPP processing between said protocol termination apparatus and said subscriber multiplexing/demultiplexing apparatus.

15. (Previously Presented) A system according to claim 14, wherein the packet processed by said subscriber apparatus and the packets multiplexed by said subscriber multiplexing/demultiplexing apparatus include one of Ethernet frame packets and IEEE 802.3 frame packets, and the packets demultiplexed by said subscriber multiplexing/demultiplexing apparatus and the packet processed by said protocol termination apparatus include PPP packets in an SDH/SONET frame transmitted over a POS signal.

16. (Previously presented) A system according to claim 14, wherein each of the packets processed by said subscriber apparatus and the packets multiplexed by said subscriber multiplexing/demultiplexing apparatus includes a packet selected from the group consisting of an Ethernet packet, an IEEE 802.3 packet, and a PPP packet in the packet, and one of Ethernet frame packets and IEEE 802.3 frame packets, the packets demultiplexed by said subscriber multiplexing/demultiplexing apparatus and the packet processed by said protocol termination apparatus include PPP packets in PPP packet in PPP packets in an SDH/SONET frame transmitted over a POS signal.

17-22. (Canceled).

23. (Previously Presented) A protocol termination apparatus including a first interface block which converts a data packet into a POS signal and transmits the signal to a backbone network, a second interface block which is connected to a subscriber multiplexing/demultiplexing apparatus to which a subscriber apparatus is connected, and receives a transmitted multiplexed signal obtained by causing said subscriber multiplexing/demultiplexing apparatus to multiplex signals which serve to transmit packets created for respective subscriber apparatuses and are received from the subscriber

apparatuses, and a third interface block connected to said subscriber multiplexing/demultiplexing apparatus, comprising:

said second interface block which extracts the packet and the MAC address added to one of the packet and an IP address of the packet from the multiplexed signal;

PPP processing means which is connected to said subscriber multiplexing/demultiplexing apparatus through said third interface block and performs a PPP processing between the subscriber apparatuses through said subscriber multiplexing/demultiplexing apparatus; and

switching means for, when a packet extracted by said second interface block includes a data packet, transferring the data packet to said first interface block on a basis of one of the MAC address and the IP address of the packet which is extracted by said second interface block, and when a packet extracted by said second interface block includes a control packet, transferring the control packet to said PPP processing means on the basis of one of the MAC address and the IP address of the packet which are extracted by said second interface block.

24. (Previously presented) An apparatus according to claim 23, wherein the packet includes one of an Ethernet frame packet and an IEEE 802.3 frame packet.

25. (Previously presented) An apparatus according to claim 23, wherein the packet includes one of a PPP packet in an Ethernet frame packet and a PPP packet in an IEEE 802.3 frame packet.

26. (Previously Presented) A protocol termination apparatus including a first interface block which converts a packet into a POS signal and transmits the signal to a backbone network, a second interface block which is connected, through an interface, to a subscriber

multiplexing/demultiplexing apparatus to which a subscriber apparatus is connected, and receives a transmitted multiplexed signal obtained by causing said subscriber multiplexing/demultiplexing apparatus, which has received signals, from the respective subscriber apparatuses, which are used to transmit packets created by the respective subscriber apparatuses, to multiplex the packets, and a third interface block connected to said subscriber multiplexing/demultiplexing apparatus, said interface being an interface which transmits a POS signal, comprising:

said second interface block which extracts a packet in the POS signal and an IP address of the packet;

PPP processing means, connected to said subscriber multiplexing/demultiplexing apparatus through said third interface block, for transmitting a control packet through said third interface block to perform a first PPP processing as a PPP processing between the subscriber apparatuses through said subscriber multiplexing/demultiplexing apparatus, and transmitting the control packet through said third interface block to perform a second PPP processing as the PPP processing with said subscriber multiplexing/demultiplexing apparatus; and

switching means for, when a packet extracted by said second interface block includes a data packet, transferring the data packet to said first interface block on a basis of the IP address extracted by said second interface block, and when a packet extracted by said second interface block includes a control packet, transferring the control packet to said PPP processing means on the basis of the IP address extracted by said second interface block.

27. (Previously Presented) An apparatus according to claim 26, wherein the packet includes a PPP packet in an SDH/SONET frame transmitted over a POS signal.

28. (Currently Amended) A demultiplexing method of receiving a multiplexed signal obtained by multiplexing a plurality of communication signals from a multiplexed signal transmitting section, demultiplexing the multiplexed signal into communication signals, and transmitting the demultiplexed communication signals to a communication signal receiving section, the method comprising:

adding, to each of the plurality of communication signals, an identification address preassigned to a predetermined signal identifying section through which a communication signal passes in a multiplexing system, including the multiplexed signal transmitting section and the communication signal receiving section, and outputting each of the communication signals;

extracting the identification address from each of the output signals;

demultiplexing the multiplexed signal for each of the communication signals on a basis of the extracted identification address; and

transferring, when the communication signals include a data packet, the data packet to a first interface block, and when the communication signals includes a control packet, transferring the control packet to a PPP processor,

wherein the communication signal comprises a PPP packet in an Ethernet frame packet or an IEEE 802.3 frame packet,

wherein, when the communication signals are received through a second interface block and include a data packet, the data packet is transferred to the first interface block on a basis of an IP address of the communication signals, and the data packet is transmitted to a backbone network upon converting the packet into a POS signal, and

wherein, when the communication signals in a multiplexed signal received from said demultiplexing apparatus through the second interface block include a control packet, the

control packet is transferred to a PPP processor on a basis of an IP address of the control packet.

29. (Previously presented) The demultiplexing method of claim 28, further comprising:

converting the demultiplexed signal into a digital subscriber line (DSL) signal; and

transmitting the DSL signal to a corresponding subscriber apparatus.

30. (Previously Presented) An access network system for performing PPP processing by using a medium access control (MAC) layer, comprising:

a computer;

a subscriber apparatus connected to the computer, said subscriber apparatus adding a PPP (Point-to-Point Protocol) header and an MAC frame header to an IP packet transmitted from the computer to form a frame packet;

a subscriber multiplexing/demultiplexing apparatus connected to the subscriber apparatus;

an access gateway connected to the subscriber multiplexing/demultiplexing apparatus, said access gateway being associated with a backbone network; and

an output Ethernet interface block configured to receive a signal, extract a frame packet and an MAC address contained in the signal, and transfer the extracted frame packet and the MAC address in the signal to a packet switch module,

wherein the output Ethernet interface block refers to a value indicated by a protocol field of a PPP packet in an extracted frame packet and performs a first discrimination of the PPP packet extracted from the signal as a PPP data packet and a second discrimination of the PPP packet extracted from the signal, and then supplies a discrimination result to a packet switch module,

wherein the packet switch module performs switching with respect to the frame packets on a basis of the MAC addresses and discrimination results transferred from the output Ethernet interface block, and performs switching with respect to PPP packets on a basis of the IP addresses transferred from the input interface block, and

wherein the MAC frame header comprises an MAC address, said MAC address including a source identification address comprising an identification address of a predetermined identification section through which a communication signal passes in a multiplex system at which a signal is output from the subscriber apparatus and a predetermined destination identification address comprising an identification address of a signal identification section through which a communication signal passes in the multiplex system to which a signal is input into the subscriber multiplexing/demultiplexing apparatus.

31. (Previously Presented) The access network system of claim 30, wherein the MAC address output from the subscriber apparatus to the subscriber multiplexing/demultiplexing apparatus comprises a destination identification address for identifying a respective input port of the subscriber multiplexing/demultiplexing apparatus and a source identification address for identifying a respective subscriber apparatus.

32. (Previously Presented) The access network system of claim 30, wherein the subscriber multiplexing/demultiplexing apparatuses comprises:

an output interface block to extract the frame packet and the MAC address added to the packet and to transfer the extracted frame packet and MAC address to a multiplexing block;

an input Ethernet interface block to receive a signal output from an input interface block of the access gateway, extract a frame packet and a MAC address, and transfer the extracted frame packet and MAC address to a demultiplexing block; and

an input interface block to execute an interface function with respect to each frame packet demultiplexed by the demultiplexing block for a corresponding subscriber and to transfer the demultiplexed frame packet to a corresponding subscriber apparatus,

wherein the multiplexing block multiplexes the frame packets input from the respective interface blocks on a basis of input MAC addresses, and

wherein the demultiplexing block demultiplexes the frame packet on a basis of an input MAC address.

33. (Currently Amended) The access network system of claim 30, wherein the access gateway comprises:

[[;]]

an output interface block to execute an interface function between the access gateway and the backbone network;

an input interface block to execute an interface function with respect to signals received from the backbone network; and

an input Ethernet interface block to receive the frame packet or PPP packet switched by the packet switch module, add a frame header comprising a MAC address of the frame, convert the frame packet into an Ethernet signal, and output the Ethernet signal .

34. (Previously Presented) The access network system of claim 33, wherein the MAC address to be added includes a source identification address comprising an identification address of an identification section through which a communication signal passes in the

multiplex system at which a signal is output from the access gateway and a destination identification address comprising an identification address of a signal identification section through which a communication signal passes in the multiplex system at which a signal is input to the subscriber multiplexing/demultiplexing apparatuses.

35. (Cancelled)

36. (Previously Presented) The access network system of claim 8, wherein the demultiplexing apparatus further comprises:

an output interface block to receive the multiplexed signal;

an output Ethernet interface block to execute an interface function between the demultiplexing apparatus and an access gateway for the extracted identification address;

an input Ethernet interface block to receive a signal from the access gateway, extract a frame packet and an MAC address from the received signal, and to transfer the extracted frame packet and the MAC address to the demultiplexing means; and

an input block to execute an interface function with respect to the extracted frame packet to transfer the demultiplexed frame packet to a corresponding subscriber apparatus.

37. (Previously Presented) The access network system of claim 36, wherein the demultiplexing block demultiplexes the frame packet on a basis of an input MAC address.

38. (Previously Presented) The access network system of claim 10, wherein the demultiplexing apparatus further comprises:

an output interface block to receive the multiplexed signal;

an output Ethernet interface block to execute an interface function with an access gateway for the extracted identification address;

an input Ethernet interface block to receive a signal from the access gateway, extract a frame packet and an MAC address from the received signal, and to transfer the extracted frame packet and the MAC address to the demultiplexing means; and

an input block to execute an interface function with respect to the extracted frame packet to transfer the demultiplexed frame packet to a corresponding subscriber apparatus.

39. (Previously Presented) The access network system of claim 38, wherein the demultiplexing block demultiplexes the frame packet on a basis of an input MAC address.